

Pennsylvania Summer Reliability

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A. Reliability Enhancement Programs

Pennsylvania Electric Company (“Penelec” or the “Company”) remains committed to providing safe and reliable electric service to its customers and employs various programs to strengthen the durability and flexibility of its electric system. Methods to improve the efficiency, adequacy and reliability of its distribution system are a continual focus. Penelec utilizes core programs to support cost-effective and reliable service. These programs include, but are not limited to:

- **Vegetation Management**
 - Routine cycle tree trimming removes selected incompatible trees within the clearing zone corridor, removes certain defective limbs that are overhanging primary conductors, controls selected incompatible brush, and targets identified off right-of-way priority trees for removal.¹
 - Routine cyclical tree trimming may include removing healthy limbs overhanging primary conductors.
 - A dedicated program has been completed in response to damage caused by the Emerald Ash Borer, to proactively remove Ash Trees off right-of-way.
 - Post-storm circuit patrols may be performed to target the areas with high tree-related outages. Circuit patrols identify trees damaged in a storm that may eventually lead to a future outage. Once identified, the tree is removed. In addition, damaged equipment identified as part of the circuit patrol is repaired or replaced.
- **Customers Experiencing Multiple Interruptions (“CEMI”)**
 - The CEMI program provides for distribution line equipment projects focused on reducing the number of outages per customer and the number of customers affected by frequent outages. Penelec completed 41 CEMI work requests in 2021.
- **Load Forecasting and Distribution Planning**
 - The load forecasting application is used to estimate future substation and circuit loading based upon historical load data and the planning criteria guidelines are then used to provide a consistent approach for planning the safe, reliable, orderly, and economic expansion of the distribution system.
- **Fuse Protection and Coordination**
 - To reduce the scope of outages, fuse protection and coordination recommendations on the 34.5 kV system will be constructed and implemented based on full circuit coordination studies.
- **Circuit Improvement**
 - To benefit customers by providing faster restoration times in the event of an outage, Penelec installed SCADA switches and a line extension at the end of circuit 00596-41.
- **Line Rehabilitation**

¹ Trees located off the right-of-way that are either dead, diseased, declining, structurally compromised, severely leaning or significantly encroaching onto the right-of-way.

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- To strengthen its electrical system, Penelec performs targeted circuit rehabilitation in zones one and two,² focusing on circuits having a high rate of equipment and line failure and animal-caused outages. Equipment that may be replaced includes crossarms, capacitors, insulators, lightning arresters and connectors. Penelec completed the rehabilitation on 18 circuits in 2021.
- SCADA Devices
 - Additional supervisory control and data acquisition (“SCADA”) devices are being installed where circuit conditions and system performance warrant. Remote SCADA controlled devices allow for remote operation to restore service to customers when an outage occurs. Remote switching eliminates the need to dispatch crews to manually operate the switches. The result is fewer customers affected and reduced outage durations. Penelec installed SCADA devices on 7 circuits in 2021. Penelec is also preparing for the implementation of distribution automation in Erie.
- Circuit Protection and Sectionalization
 - Circuit protection and sectionalization is aimed at identifying and correcting or improving coordination between protective devices and isolating smaller segments of the circuit with the goals of ensuring safety and security to the public and employees; maximizing service reliability to customers by reducing the number of customers impacted and the frequency and duration of outages; and minimizing damage to distribution equipment due to overcurrent events. Penelec replaced or installed 314 devices in 2021 on circuits which were selected based on overall performance as well as protection needs.
- Long-Term Infrastructure Improvement Plans (“LTIIIP”)
 - Penelec first began to execute its LTIIIP programs in 2016. These plans include expenditures and programs designed to accelerate repair, improvement or replacement of aging infrastructure in order to adequately maintain and improve the efficiency, safety, adequacy and reliability of the distribution system. On January 16, 2020, Penelec’s LTIIIP II, for the period beginning January 1, 2020 and ending December 31, 2024 (“LTIIIP II”) was approved and implementation of that plan is currently underway. Note that some of the initiatives described above are included in the Company’s LTIIIP II.

B. Preventative Maintenance Programs

In accordance with 52 Pa. Code § 57.198, every two years Penelec files a Biennial Inspection, Maintenance, Repair and Replacement Plan³ for approval by the Commission. This Biennial Plan is designed to reduce the risk of outages on the Company’s system and form the basis for the Company’s inspection and maintenance objectives. The Biennial Plan includes programs

² Zone one is defined as the portion of the circuit from the substation breaker to the first protective device. Zone two is defined as the three-phase conductor and devices after the first protective device.

³ On January 15, 2020, Penelec’s Biennial Inspection, Maintenance, Repair and Replacement Plan for the period January 1, 2021 through December 31, 2022 was approved by the Commission at Docket No. M-2009-2094773.

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to conduct vegetation management, pole inspections, distribution overhead line inspections, distribution transformer inspections, recloser inspections and substation inspections.

These well-established maintenance programs ensure the existing system will continue to operate in a safe and reliable manner and serve to identify any potential system issues so they can be proactively addressed.

C. Capacity Planning

Due to ongoing system enhancements and the hard work of employees and contractors, Penelec is able to reliably serve its customers. The primary driver of customer demand this summer is again expected to be warm temperatures across the region.

Penelec does not foresee significant concerns with system delivery capacity during the upcoming summer based on its performance during last summer's peak. Ongoing facility enhancements designed to improve reliability, load-bearing upgrades, and customers' adoption of energy efficiency and conservation opportunities are being viewed as additional opportunities to ensure the reliability and capacity availability of the system.

D. 2021/2022 Storm Update and Lessons Learned

In calendar year 2021, Penelec had a total of twelve reportable⁴ storm events, of which one was a major event.

During restoration efforts, working safely and efficiently is the main objective. Regional conference calls are held for preparation and logistics planning. Effective planning allows for the precise deployment of crews, supplies, and equipment. Employees are also staggered around the clock to maximize productivity.

After each significant storm event, Penelec leadership conducts post-storm review meetings to identify and disseminate lessons learned which are used to improve the emergency response plan.

From storm review action items identified as a result of 2021 and early 2022 restoration events, Penelec has:

- Continued to publish Incident Action Plans shortly after the Company is predicted to be affected by a weather event.
- Continued to stagger shifts to maximize productivity and safety of restoration crews.
- Continued effort to maintain communications and Incident Command System (ICS) roles and responsibilities through organizational changes.

⁴ "Reportable" is defined as an event where filed reports are necessary to the Pennsylvania Public Utility Commission.

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Also, Penelec is preparing for the implementation a new outage management system, which is scheduled to take place in the third quarter of 2022. Benefits of the new system include enhanced system monitoring allowing distribution system operators to respond more quickly to outages; remote configuration to enable the safe isolation of equipment, preventing outages, and allowing for safer and more efficient restoration; and advanced monitoring and control capabilities improving situational awareness and increasing efficiency.

Penelec continues to work and strive to safely restore all customers in a timely and efficient manner.

E. 2021 Summer Readiness

Capacitor Inspections – By June 1, 2022, Penelec will have inspected all line capacitor banks and completed all necessary repairs or replacements to ensure at least 98% availability.

Substation – By June 1, 2022, Penelec will have inspected all substation capacitor banks and completed necessary repairs or replacements to ensure minimum 98% available reactive support. In addition, a review of spare equipment will have been completed. Spare equipment includes voltage regulators and substation cooling items such as transformer fans.

By June 1, 2022, Penelec will have cleaned and inspected all transformer cooling systems. Cleaning removes the accumulation of Cottonwood seedlings that are released each May and June. In addition, fans and pumps are inspected and their functionality verified during the cleaning process.

Capacity Additions:

- **Keystone #3 500/230 kV Transformer Replacement (PJM RTEP s1736)** – Replaces the #3 500/230 kilovolt (“kV”) transformer with a higher capacity transformer. This equipment is in service.
- **Garman – Glory 115 kV Terminal Upgrades (PJM RTEP s1771.1-2)** – Upgrades limiting terminal equipment on the Garman – Glory 115 kV line. This equipment is in service.
- **Edinboro South 115 kV Terminal Upgrades (PJM RTEP s1820.1-3)** – Upgrades limiting terminal equipment on the Edinboro South – Venango Junction and Edinboro South – Erie South 115 kV lines. This equipment is in service.
- **Blairsville East 115 kV Ring Bus (PJM RTEP s1730)** – Converts Blairsville East 115 kV substation into a ring bus and upgrades limiting terminal equipment at Shelocta and Seward 115 kV substations. This equipment is in service.
- **Quemahoning 230 kV Switch Replacement (PJM RTEP s1772.1-3)** – Installs SF6 interrupters on 230 kV network switches at Quemahoning; eliminate ground switch and install 230 kV breaker on the high side of the 230/115 kV transformer at Hooversville; and adjust relay settings at Homer City 230 kV substation. This equipment is in service.
- **Grandview – Titusville 115 kV Terminal Upgrades (PJM RTEP s1887.1-2)** – Upgrades limiting terminal equipment on the Grandview – Titusville 115 kV line. This equipment is in service.

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- **East Pike – Lucerne 115 kV Terminal Upgrades (PJM RTEP s2043.1-2)** – Upgrades limiting terminal equipment on the East Pike – Lucerne 115 kV line. This equipment is in service.
- **East Sayre – East Towanda 115 kV Terminal Upgrades (PJM RTEP b2621)** – Upgrades limiting terminal equipment on the East Sayre – East Towanda 115 kV line. This equipment is in service.
- **Lackawanna – North Meshoppen 230 kV Line Rebuild (PJM RTEP b2552.1)** – Rebuild/reconductor approximately 26.91 miles of the Lackawanna – Oxbow – North Meshoppen 230 kV line with higher capacity wire and upgrade terminal equipment at Oxbow and North Meshoppen 230 kV substations. This equipment is in service.
- **Tyrone North – West Vaco – Vail 46 kV Terminal Upgrades (PJM RTEP s1734)** – Replaces terminal equipment at Tyrone North and installs higher capacity switches at West Vaco and Vail. This equipment is in service.
- **East Towanda 115 kV Breaker and a Half (PJM RTEP b2678)** – Converts East Towanda 115 kV substation into a breaker-and-a-half configuration and upgrades limiting terminal equipment at remote ends. This equipment is in service.
- **Seward – Tower 51 115 kV Terminal Upgrades (PJM RTEP s2176.1-2)** – Upgrades limiting terminal equipment at Seward and Tower 51 115 kV substations. This equipment is in service.
- **Armstrong – Brookville 138 kV Terminal Upgrades (PJM RTEP s2045.1)** – Upgrades limiting terminal equipment at Armstrong and Brookville 138 kV substations. This equipment is in service.
- **Westfall – 20th Street – Collinsville 46 kV Line (PJM RTEP s1922)** – Rebuild/reconductor 20th Street – Collinsville 46 kV line and build a new line between Westfall and 20th Street 46 kV. This equipment is in service.
- **Shawville – Shingletown 230 kV Terminal Upgrades (PJM RTEP s2051.1-2)** – Upgrades limiting terminal equipment at Shawville and Shingletown 230 kV substations. This equipment is in service.
- **Elko – Shawville 230 kV Terminal Upgrades (PJM RTEP s2052.1-2)** – Upgrades limiting terminal equipment at Elko and Shawville 230 kV substations. This equipment is in service.
- **Lewistown #1 230-46 kV Transformer Replacement (PJM RTEP s1882.1-2)** – Replace the #1 230/115-46 kV transformer with a higher capacity 230-46 kV transformer. This equipment is in service.
- **Jackson Road – Seward 115 kV Terminal Upgrades (PJM RTEP s2044.1-2)** – Upgrades limiting terminal equipment at Jackson Road and Seward 115 kV substations. This equipment is in service.
- **Hooversville – Scalp Level – Rachel Hill 115 kV Terminal Upgrades (PJM RTEP s2046.1-3)** – Upgrades limiting terminal equipment at Hooversville, Scalp Level, and Rachel Hill 115 kV substations. This equipment is in service.
- **Edinboro South -Venango Junction 115 kV Line Breaker (PJM RTEP b2679)** - replaces the Venango Junction line switch with a 115kV line breaker at Edinboro South. This equipment is in service.
- **Hill Valley 115-46, 25MVA Transformer 1 Replacement (PJM RTEP s1821)** - Replaces existing 115/46 kV transformer with a larger capacity bank. This equipment is expected to be in-service by May 27, 2022.

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- **Homer City 345 kV North Transformer Terminal (PJM RTEP b2767)** - Relocates the 345 kV north transformer terminal at Homer City to avoid a stuck breaker condition. This equipment is in service.
- **Roxbury 115 kV Ring Bus Construction and Replace 138-115 kV T2 Transformer (PJM RTEP s1643)** - Build a new Roxbury 115kV ring bus adjacent to the existing station and replace the existing Roxbury 138-115 transformer with a higher capacity bank. This equipment is in service.
- **Loretto-Summit 46kV Line Rebuild (PJM RTEP s1884)** - Rebuild the Loretto - Summit 46kV (SGR Line) circuit with 336 ACSR. Upgrade relay thermal, overcurrent relay, and station conductor at Summit terminal. This equipment is in service.
- **Erie West 115kV Ring Bus (PJM RTEP s1731)** - Convert the existing 115 kV yard to a 115 kV ring bus. This equipment is in service.
- **Westfall - 20th Street - Collinsville 46 kV Line Rebuild (RTEP s1780.1-5)** – Rebuild/reconductor line between Westfall and 20th street and reconductor the 20th street - Collinsville 46 kV line to eliminate the need for the 3rd bank at Altoona. This equipment is in service.
- **Seward & Cooper Substations Line Relays and Carrier Equipment Upgrades (PJM RTEP s1889.1-2)** - Upgrade the line terminals at Cooper and Seward on the Cooper-Seward 115kV HT line. This equipment is in service.
- **Glory 115 kV Bus Expansion and 115kV Capacitor Installation (PJM RTEP b2984)** - Expand the 115 kV Bus to a double breaker-double bus configuration; install 115 kV Capacitor bank and associated facilities. This equipment is in service.
- **Grandview-Titusville 115 kV Relay Replacement Failed KR Carrier Equipment (PJM RTEP s1888.1-2)** - Upgrades the carrier equipment on this line. This equipment is in service.
- **North Meshoppen 230 kV Ring Bus and #3 Transformer Replacement (PJM RTEP b2952)** - Replaces the #3 transformer at North Meshoppen with a new standard bank and eliminates the reactor. Converts the 230 kV yard to a five-breaker ring bus. This equipment is expected to be in-service by May 27, 2022.
- **Gore Junction - Rolling Meadows 115 kV GR LINE Replacement and Terminal Upgrades (PJM RTEP s2048.1-2)** - Replaces line relaying and terminal equipment. This equipment is expected to be in-service by May 20, 2022.
- **Erie West #1 345/115 kV Transformer and Circuit Switcher Replacement** – Replace #1 345-115kV transformer and high side circuit switcher with MOAB PJM RTEP. This equipment is in service.

Transmission Preparedness – An annual transmission readiness review is coordinated by FirstEnergy’s Transmission Operations Services department with Penelec for the purposes of ensuring the capability and reliability of the system for the summer. The detailed review did not reveal any significant issues for the summer of 2022. Based on the system conditions modeled, the Penelec transmission system is expected to sufficiently support the forecasted peak summer loading.

Two aerial patrols are conducted via helicopter annually by FirstEnergy’s Transmission Maintenance section to inspect transmission facilities. The purpose of routine patrols is to ensure the integrity of in-service transmission lines to maintain safe and reliable service. Both of these aerial patrols will be completed by year end.

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Emergency Exercise – As part of the FirstEnergy Utilities (“FEU”) Emergency Preparedness program, Penelec completed an emergency exercise on March 31, 2022. The exercise facilitated the testing and validation of key emergency response roles, systems, and processes. The primary objective of the exercise was to ensure a complete understanding of the restoration process by all participants through exposure to a variety of real-world scenarios and decision-making challenges that could be experienced during actual restoration events.

Event Preparedness – FirstEnergy’s in-house meteorologists use highly sophisticated, proprietary data and forecasting models specifically designed to provide actionable intelligence. When predicted weather meets specific criteria, planning and preparation work is immediately initiated, often days before forecasted impact.

As part of the preparation efforts, Penelec’s executive leadership and operations managers implement the emergency restoration process. Based on available data, resource needs are evaluated, and requests are submitted to the FEU Emergency Operations Center. These requests can include but are not limited to line resources (both internal to FirstEnergy and external), hazard responders, damage assessors, public protectors, vegetation crews, and equipment and material needs. Depending on the predicted magnitude of the event, pre-identified staging areas can be quickly activated to prepare for the efficient deployment of crews and equipment.

Refresher Training – All employees with emergency response roles receive appropriate refresher training at specified intervals to ensure they are immediately deployable when an event impacts the system. Expectations for employees to complete appropriate training and verify all equipment and personal protective equipment are available and in proper working order are communicated each year during emergency exercises and verified by Penelec management.

Staffing – Penelec is appropriately staffed for the 2022 summer storm season. Penelec performs an annual staffing analysis that accounts for attrition, including retirements, to determine the proper staffing levels of craft workers. Penelec then enrolls students in the Power Systems Institute (“PSI”) based on the results of the analysis. PSI is a unique, two-year program that combines classroom learning with hands-on training. Penelec is planning to hire approximately ten line worker graduates and six substation electrician graduates in 2022. The objective of the PSI program is to proactively hire a diverse group of individuals that will fulfill the line work and substation electrician staffing needs for Penelec. The following colleges have partnered with Penelec to support these line worker and substation electrician development:

- Pennsylvania Highlands Community College (for Line and Substation students)
- Edinboro University (for Line students)

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For larger scale events, Penelec is able to supplement its own resources by accessing FirstEnergy’s portfolio of operating companies that includes the additional three companies located within Pennsylvania, as well as an additional six operating companies in other jurisdictions. The consistency in standards and work practices employed across all ten of these operating companies enables streamlined resource sharing in a way that promotes both safety and efficiency.

FirstEnergy, for itself and its affiliated operating companies, including Penelec, is a member of the following Regional Mutual Assistance Groups (“RMAGs”) and can call upon them to request additional resources when needed:

- Great Lakes Mutual Assistance Group
- North Atlantic Mutual Assistance Group
- Southeastern Electrical Exchange

A National Response Event can be activated by Edison Electric Institute member utilities when multiple RMAGs cannot adequately support the resource requirements of the requesting utilities. In addition to working with RMAG organizations, FirstEnergy works with non-RMAG utility companies and contractors to secure resources.

F. Storm Response

Outage Restoration Strategy – Depending on the predicted severity of an impending weather event, Penelec typically begins preparing for potential outages before severe weather hits. Based on the projected impact to Penelec’s system, plans are activated so that properly scaled preparations can be made.

Information obtained through various tools and resources is critical to determine the type, number and location of resources needed to assure prompt restoration of service. Line personnel, damage assessors and hazard responders are integral resources in providing initial and ongoing assessments of the damage in the field. Line personnel are equipped with mobile data terminals (“MDTs”) in their vehicles and will enter damage information directly into the MDT. This information is immediately available for viewing in the Outage Management System (“OMS”). The OMS is the central collection point for all relevant information concerning damage reports, assessment, and configuration of the electric distribution system. During emergencies that meet triggering criteria, the circuit quarantine process is used for rapid assessment and repair of heavily damaged circuits. Additionally, there are two apps that employees can use on mobile devices to automatically enter damage information into the Company's OMS.

In response to power outages and other systems emergencies, Penelec maintains a copy of its Emergency Plan for Service Restoration which provides the guidelines for all common processes and procedures for conducting emergency preparedness, response, and service restoration. Further, Penelec is in the process of incorporating Incident Command System

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principles into its emergency response organization to adhere to the principles and high-level structure of the National Incident Management System as appropriate in an electric utility environment.

Communications and Outreach – External Affairs consultants establish communications with emergency management agencies, local officials, county commissioners, and legislators and their offices in advance of and throughout a storm to keep them apprised of preparation and planning efforts. Communications representatives also contact the media to enlist their help in encouraging customers to prepare for the likely storm events and provide information on who to call if they lose power. Proactive email alerts and phone messages are initiated to key stakeholders alerting them of the potential for extended power outages. These efforts and face-to-face outreach are closely aligned with the Company’s service restoration efforts. The Company also provides safety messages via newspapers, radio, and online banner ads.

Penelec customers can stay abreast of restoration progress through a variety of means. A customer can access the Storm Restoration Process page of the Company’s website to learn about the damage assessment and repair prioritization processes as well as the importance of customer calls and outage reporting during the restoration process. Customers can access the 24/7 Power Center outage map that provides county-by-county information. Through this site users can obtain the number of customers served and the number of customers out of power at the county level as well as estimated time of restoration (“ETR”) information. In addition, the 24/7 Power Center outage map shows the status of crews restoring service, and informs customers when crews have been dispatched, when they are working on a repair and when additional crews or equipment are needed to complete restoration work.

Penelec’s mobile website allows customers to report outages and connect to the 24/7 Power Center outage map which has been optimized for mobile devices. From the mobile site, customers can view personalized outage status for an outage they have reported. The mobile website and app, as well as the full Penelec website, also allow customers to register for outage-related alerts via text messages and/or email. These platforms also provide instructions to use two-way text messaging, an interactive option for customers to report outages and obtain outage updates.

Furthermore, Penelec uses Twitter and Facebook to share additional safety reminders, ETRs, updates on restoration efforts, explanations of the restoration process and information about the arrival of additional crews, water and ice locations, and links to other resources such as shelters.

In addition, interactive voice response (“IVR”) messaging is used to communicate restoration information to customers. Messaging is also relayed to customers who have called Penelec regarding their individual outage. Live agent customer service representatives are available and have the same information at their disposal.

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For extended power outages, Communications issues regular news releases and media advisories over both traditional media channels and social media to update customers on the status of power restoration efforts, as well as provide realistic ETRs so customers can plan accordingly. Communications proactively issues safety messaging ranging from avoiding downed wires to properly hooking up and operating generators. The Company also has plans in place to provide free water and ice to customers without service. Once locations have been determined, this information is communicated to customers via the IVR, press releases, social media and the website.

Outage Restoration and Storm Response Best Practices – Penelec continues to review each storm event, and many of the practices adopted as mentioned above stemmed from sharing best practices with other utilities, a practice that continues today.